In : Lee, Jeffrey A. and Zobeck, Ted M., 2002, Proceedings of ICAR5/GCTE-SEN Joint Conference, International Center for Arid and Semiarid Lands Studies, Texas Tech University, Lubbock, Texas, USA Publication 02-2 p. 131

# The role of instrumentation in aeolian research; recent advances and future challenges

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This paper represents a compilation of our collective experience in attempting to measure accurately aeolian transport processes in the field and laboratory. All measurements of aeolian processes can be generalized into at least one of the following categories: 1) a property of the airstream, 2) a mass transport rate (either horizontal or vertical), and 4) a gravitational or inter-particle force moment at the surface that opposes motion. In association with each of these categories, we address the following questions: What do we need to know? What do we presently measure? What problems exist? What improvements need to be made? What spatial and temporal scales need to be addressed? In essence, the purpose of this paper is an attempt to define, review and stimulate discussion regarding the many challenges facing aeolian researchers engaged in empirical work; it is not to provide the answers. Specific topics addressed will include measurement of: 1) wind flow and determination of surface shear stress; 2) tractive stress on rough surfaces; 3) particle transport rate; and 4) crust strength and capillary force. The various techniques currently used to measure these processes and surface characteristics will be discussed in the context of time scales varying from seconds to years, and spatial scales varying from sub-millimeter to meters.